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MIRIDAE AND COLEOPTERA ASSOCIATED WITH TULIP TREE FLOWERS AT ITHACA, NEW YORK

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Abstract.—The Miridae and Coleoptera on tulip tree (*Liriodendron tulipfera* L.) flowers were examined in June, 1979 at Ithaca, New York. The mirids are mainly *Lygocoris caryae* and *L. omnivagus*, and are probably attracted to tulip tree to feed on the flowers. The mirid-flower association changes with the age of the flower; young flowers support a larger mirid fauna than older flowers. The Coleoptera are mainly Cantharidae and Cephaloidae. Notes on the feeding behavior of these insects are recorded. These are the first feeding records for *Cephaloon lepturides*, *Cantharis scitulus*, *C. rectus*, and *Podabrus brunnicollis*, and the first records for *Lygocoris caryae*, *L. omnivagus*, *L. tiliae*, *L. hirticulus*, and *L. belfragii* on tulip tree.

The tulip tree or yellow poplar, *Liriodendron tulipifera* L. is an important hardwood in the Appalachian region. It is distributed from central Massachusetts to Ontario and Wisconsin, and southwest to Florida, Mississippi, and Arkansas (Wiegand and Eames 1925), and is relatively common in rich, light, loamy woodland soils. Its northern limit passes through upper New York State.

More than 100 species of insects have been reported to feed on the leaves and stems of tulip tree (Felt 1905; Felt and Rankin 1932; Herrick 1935; Doane et al. 1936; Burns and Gibson 1968; Burns 1970; Peigler 1976; Futuyma and Gould 1979). The pollinators of *L. tulipifera* are not known but may be similar to those on *Magnolia acuminata* L. (Downes 1973; Thien 1974; Thien et al. 1975).

Flowers are an important resource for insects. Current research on pollination ecology has focussed on competition between pollinators for flower products and between plants for pollinators (Feinsinger 1976; Heinrich 1976; Rathcke and Poole 1977; Poole and Rathcke 1979). However, parasitoids, predators, and herbivores also consume flowers and flower products. Evans and Murdoch (1968) found that 68 percent of the adult insect fauna of an old field in Michigan were flower feeders. The insects utilizing many species of flowers have been described (Kerner 1878; Robertson 1928); Wheeler and

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Henry (1976) present observations on five species of mirids that feed on honey locust flowers, and Henry (pers. comm.) has observed both nymphs and adults of *Neurocolpus nubilus* feeding on and damaging petals of tulip tree in Pennsylvania. This paper describes the associations of flower feeding mirids and Coleoptera on *Liriodendron tulipifera* flowers at Ithaca, New York.

Materials and Methods

Two individuals of *Liriodendron tulipifera* on Turkey Hill in Ithaca, New York were observed on the edge of a weedy lawn, surrounded by poplar, yellow birch, white pine, white ash, basswood, hickory, and oaks. The trees are about 50 feet tall, and first started blooming on June 7, 1979, continuing through June 25.

On June 8 and 9 general collections were made from about 300 flowers. On June 10, all the insects were removed from the open flowers on four low branches, and haphazardly twenty of these flowers were designated as "old flowers." Eight "young flowers," opening between the mornings of the 10th and 11th, were also identified. Insects were collected from these flowers for the next five consecutive mornings between 0600 and 0700 hours. On June 14, five more newly opened flowers were added to the young flower sample.

On June 10 at 0700 hours, twenty mirids in six flowers were marked with fluorescent dusts sprayed into the flowers. No insects left these flowers immediately after marking. At 0800 the following morning, all the mirids in those six flowers were collected and identified.

Results and Discussion

A total of 55 Miridae and 47 Coleoptera were collected in 150 flower-days of sampling (Table 1). Most of the Miridae (96 percent) were species of the genus *Lygocoris,* and most of the Coleoptera were represented by the families Cantharidae (55 percent) and Cephaloidae (38 percent).

Miridae.—All the mirids were observed feeding in the flowers, mainly on the lower portion of the carpels. It is not known if they damage the seed. No nymphs of any of the species were seen on tulip tree during the period of observation. *L. tulipifera* is probably only an adult feeding host for these insects.

Lygocoris caryae breeds on hickory (*Carya ovata,* and *C. alba*), and to a lesser extent on pecan, and walnut (Knight 1917; Blatchley 1926; Smith 1940; Kelton 1971). It has also been found on *Rhus typhina, Tilia americana, Robinia pseudoacacia, Quercus* sp., and *Juniperus virginiana* (Knight 1941; Kelton 1971). It can cause economic damage on peaches and pears (Caesar 1920; Ross and Caesar 1921, 1927; Garman 1936; Smith 1940; Knight 1941),

Table 1. Number of insects caught in young and old *L. tulipifera* flowers. A single flower-day sample consists of the insects accumulating in one flower during one 24 hour period. *L. belfragii* was collected while general collecting on June 8 and 9. All insects were identified by the author, and are deposited in the Cornell University collection under C.U. Lot #1108.

	Young flowers 50 flower-days	Old flowers 100 flower-days	χ^2
Miridae	37	19	
Lygocoris caryae (Knight)	18	9	13.5*
L. omnivagus (Knight)	14	7	10.5*
Other mirids**	5	3	—
Cantharidae	12	14	1.92
Cantharis scitulus Say	0	3	—
C. rectus Melsheimer	9	9	2.25
Podabrus spp.†	3	2	—
Cephaloidae			
Cephaloon lepturides Newman	7	11	0.29
Other Coleoptera††	2	0	—

* $P < 0.005$, all others n.s.

** *L. tiliae* (Knight), *L. hirticulus* (Van Duzee), *L. belfragii* (Reuter), *Taedia* sp., and *Monosynamma bohemani* (Fallen).

† *P. brunnicollis* Fab. and *P. rugulosus* LeConte.

†† *Grammoptera haemetites* (Newman) [Cerambycidae] and *Orsodacne atra* (Ahrens) [Chrysomelidae].

migrating as far as 300 yards into orchards, returning to hickory to oviposit. Its economic damage is often severe, but highly variable in space and time.

Lygocoris omnivagus has been reported from a large number of hosts, breeding on oaks (*Quercus alba, Q. rubra,* and *Q. coccinea*), and to a lesser degree on *Cornus florida, C. circinata, Castanea* sp., and *Viburnum acerifolium* (Knight 1917; Blatchley 1926; Knight 1941). Kelton (1971) reports it from numerous other species. It too can cause significant damage to peaches and pears (Ross and Caesar 1921, 1927; Garman 1928, 1936; Kelton 1971), migrating to orchards to feed, and returning to its host plants to oviposit.

L. tulipifera is a new feeding record for both of these species, and also for *Lygocoris tiliae, L. hirticulus,* and *L. belfragii.* The individuals I caught probably migrated to tulip tree from nearby host trees, where they will return to oviposit. Many of the individuals I observed were covered with tulip tree pollen, so they may be pollinators. But many bees and wasps were also observed working the flowers, so the importance of mirids as pollinators is unknown.

Coleoptera.—Little is known about the biology of the Cantharidae. *Cantharis* spp. are known to feed on aphids, mealybugs, and plant materials

such as pollen and nectar (Motizambert 1908; Essig 1926; Fluke 1929; Balduf 1935; Claussen 1940). *Podabrus* spp. also feed on aphids and pollen (Webster 1876–83; Blatchley 1910; Wilson 1913; Essig 1926; Fluke 1929; Smith 1936; Claussen 1940; Fender 1973).

The cantharids on *L. tulipifera* flowers were observed feeding on the pollen and other litter that collects in the bottoms of the flowers. My observations are the first feeding records for *Cantharis scitulus, C. rectus,* and *Podabrus brunnicollis*. Although *P. rugosulus* is known to eat aphids (Blatchley 1910; Fluke 1929), this is the first record of it eating plant material.

The association of adult *Cephaloon lepturides* with *L. tulipifera* is the first published ecological record for adults of this species. This is an active beetle, more so than the smaller cantharids, and moves rapidly inside the flowers. It is not known if these beetles eat plant material. In captivity, I observed *C. lepturides* to kill and eat an adult of *L. caryae* and *L. tiliae* in a manner similar to the cantharids (Motizambert 1908; Tilden 1950).

The insect-flower associations change with age, young flowers supporting a different mirid fauna than old flowers (Table 1). This was also observed in the general collections on the 8th and 9th. *Lygocoris caryae* and *L. omnivagus* were more abundant in young flowers than old flowers. All the beetles appeared in flowers older than 3 days. Since these beetles are pollen feeders, they may be attracted to flowers after anther dehiscence.

The mirids may be displaced from the older flowers by the cantharids and *Cephaloon lepturides*. The beetles move around inside the flowers much more than the mirids, often bumping into them. The mirids stop feeding to move and avoid the beetles. These interruptions may limit feeding time so that the mirids leave the older flowers that have beetles to find a better, more available food resource. Also, since these beetles may be potential predators, the mirids may be avoiding predation.

Alternatively, flower quality may decline with age and the mirids are avoiding low quality flowers. Of the marked mirids, only 55 percent stayed in the same flower for a day. None of these flowers contained beetles, so this shows that the mirid-flower association is ephemeral and that mirids move enough to be able to respond rapidly to factors such as changes in flower quality and availability.

Even in such a temporary resource as flowers there are regular changes in herbivore presence. Be it a decline in flower quality with time or displacement by beetles, the mirid fauna changes rapidly, apparently exploiting just a portion of a flower's life.

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Literature Cited

Balduf, Walter V. 1935. The Bionomics of Entomophagous Coleoptera (John S. Swift Co.: St. Louis), 220 p.

Blatchley, W. S. 1910. Coleoptera or Beetles (The Nature Publ. Co.: Indianapolis), 1386 p.

———. 1926. Heteroptera or True Bugs of Eastern North America (The Nature Publ. Co.: Indianapolis), 1116 p.

Burns, Denver P. 1970. Insect Enemies of Yellow-Poplar. USDA Forest Service Research Paper NE-159.

——— and Lester P. Gibson. 1968. The leaf-mining weevil of yellow-poplar. Can. Ent. 100:421–429.

Caesar, L. 1920. Notes on leaf bugs (Miridae) attacking fruit trees in Ontario. 51st Ann. Rpt. Ent. Soc. Ont. 14–16.

Claussen, C. P. 1940. Entomophagous Insects (McGraw-Hill: New York), 688 p.

Doane, R. W., E. C. Van Dyke, W. J. Chamberlain and H. B. Burke. 1936. Forest Insects (McGraw-Hill: London), 463 p.

Downes, John A. 1973. Endopterygote insects and the origin of the angiosperm flower. International Congress of Systematic and Evolutionary Biology, 1st, Boulder, Colo., 1973. Abstracts of papers, p. 9.

Essig, E. O. 1926. Insects of Western North America (Macmillan: New York), 1035 p.

Feinsinger, Peter. 1976. Organization of a tropical guild of nectarivorous birds. Ecol. Monogr. 46:257–291.

Felt, Ephraim P. 1905. Insects Affecting Park and Woodland Trees. New York State Museum Memoir 8, pt. I and II.

——— and W. Howard Rankin. 1932. Insects and Diseases of Ornamental Trees and Shrubs (Macmillan: New York), 507 p.

Fender, Kenneth M. 1973. Ecological notes on *Podabrus* (Coleoptera: Cantharidae). Coleopt. Bull. 27:11–17.

Fluke, C. L. 1929. The known predaceous and parasitic enemies of the pea aphid in North America. U. Wisc. Agr. Expt. Sta. Res. Bull. 93.

Futuyma, Douglas J. and Fred Gould. 1979. Associations of plants and insects in a deciduous forest. Ecol. Monogr. 49:33–50.

Garman, Philip. 1928. Plant bug injury to fruits. Conn. Agr. Expt. Sta. Bull. 305:729–731.

———. 1936. Plant bug injury to fruits. Conn. Agr. Expt. Sta. Bull. 383:357–358.

Heinrich, Bernd. 1975. Flowering phenologies: bog, woodland, and disturbed habitats. Ecology 57:890–899.

Herrick, Glenn W. 1935. Insect Enemies of Shade Trees (Comstock: Ithaca), 417 p.

Kerner, A. 1878. Flowers and Their Unbidden Guests (C. Kegan Paul: London), 164 p.

Knight, Harry H. 1917. A revision of the genus *Lygus* as it occurs in America north of Mexico, with biological data on the species from New York. Cornell Agr. Expt. Sta. Bull. 391.

———. 1941. The Plant Bugs, or Miridae, of Illinois. Bull. Ill. Nat. Hist. Survey 22(1).

Motizambert, Eric. 1908. Lampyridae and aphids. Can. Ent. 40:36.

Peigler, Richard S. 1976. Observations on host plant relationships and larval nutrition in *Callosamia* (Saturniidae). J. Lepid. Soc. 30:184–186.

Poole, Robert W. and Beverly J. Rathcke. 1979. Regularity, randomness, and aggregation in flowering phenologies. Science 203:470–471.

Rathcke, B. J. and R. W. Poole. 1977. Community patterns of flowering phenologies. Bull. Ecol. Soc. Amer. 58(2):15 (Abstract).

Robertson, Charles. 1928. Flowers and Insects: Lists of Visitors of Four Hundred and Fifty-three Flowers (Science Press: Carlinville, Ill.), 221 p.

Ross, W. A. and L. Caesar. 1921. Oak plant bugs. 52nd Ann. Rpt. Ent. Soc. Ont. 44–45.

——— and ———. 1927. Oak and hickory plant bugs. 58th Ann. Rpt. Ent. Soc. Ont. 17.

Smith, Edward H. 1940. The biology and control of the hickory capsid, *Lygus caryae* Knight (Hemiptera: Miridae), as a peach pest. M.S. Thesis, Cornell University.

Smith, J. W. 1936. Biology of the mealy plum aphid, *Hyalopterus pruni* (Geoffroy). Hilgardia 10:167–207.

Thien, Leonard B. 1974. Floral biology of magnolia. Amer. J. Bot. 61:1037–1045.

———, W. H. Heimermann and R. T. Holman. 1975. Floral odors and quantitative taxonomy of *Magnolia* and *Liriodendron*. Taxon 24:557–568.

Tilden, J. W. 1950. The feeding of *Podabrus pruinosus* LeConte (Cantharidae). Coleopt. Bull. 4:92.

Webster, F. M. 1876–1883. Notes upon the food of predaceous beetles. Bull. Ill. St. Lab. Nat. Hist. 1, 149–152.

Wheeler, A. G., Jr. and Thomas J. Henry. 1976. Biology of the honey locust plant bug, *Diaphnocoris chlorionis*, and other mirids associated with ornamental honey locust. Ann. Amer. Ent. Soc. 69:1095–1104.

Wiegand, Karl M. and Arthur J. Eames. 1925. The Flora of the Cayuga Lake Basin, New York: Vascular Plants. Cornell Univ. Agr. Expt. Sta. Memoir 92.

Wilson, H. F. 1913. Notes on *Podabrus pruinosus*. J. Econ. Ent. 6:457–458.

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